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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/876,443

06/07/2001

Robert Allen Selzer

1520-006 (1426)

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02/26/2004

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EXAMINER

KIKNADZE, IRAKLI

ART UNIT

PAPER NUMBER

2882

DATE MAILED: 02/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/876,443

Applicant(s)

SELZER ET AL.

Examiner

Irakli Kiknadze

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 11-25, 27, 37, 38 and 40-56 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 44 and 52-56 is/are allowed.
- 6) ☒ Claim(s) 27, 37, 38 and 40-50 is/are rejected.
- 7) ☒ Claim(s) 11-25 and 51 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

1. In response to the office action of 06/05/03 the Amendment has been received on 11/12/2003.

Claims 37,44, and 45 have been amended.

Claims 51-56 have been added.

Claims 26, 28-36 and 39 have been canceled.

Claims 11-25, 27, 37, 38 and 40-56 are pending in the application.

### ***Drawings***

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the system comprising an X-ray source for exposing a substrate, stepper and vibration insulation must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

3. Claim 51 is objected to because of the following informalities: Claims 51 and 44 disclosing identical subject matter. Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 11-25 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. An X-ray source is critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). With respect to claims 11-25, there is no teaching of how to expose a resist without irradiating with X-rays.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claim 27 is rejected under 35 U.S.C. 102(e) as being anticipated by Ohsaki (US Patent 6,038,013).

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With respect to claim 27, Osaki discloses a system for exposing a substrate comprising a stepper and an X-ray source with vibration insulation there between (column 1; line 45 – column 2; line 4).

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 37, 38 and 40-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyake et al. (US Patent 6,038,279).

With respect to claim 37, Miyake teaches exposing a resist on a substrate comprising: providing the substrate (106) with a film of resist; placing the substrate (106) on a stage (108); providing X-ray radiation from a point source (109,110,101,111); using a parabolic mirror (103) for collimate or concentrate the X-ray radiation; providing a mask (104) defining exposure of the resist; illuminating the mask (104) with the X-ray radiation after the collimating or concentrating step; and exposing the resist (106) with X-ray radiation passing through the mask (104) (column 1; lines 3-52; Fig. 10). Miyake fails to disclose an inline collimator but discloses a parabolic mirror (103). It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the collimator or concentrator with the parabolic mirror since it was known in

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the art that the parabolic mirror is used for collimate or concentrate the X-ray radiation and it appears that the invention would perform equally well with using one.

With respect to claim 38, Miyaki teaches exposure method used in the production of devices having fine patterns, such as semiconductor circuit elements and obviously can be in less than 100nm range, as well known in semiconductor art.

With respect to claims 40 and 41, Miyaki teaches that the substrate comprising a wafer. The wafer comprises a semiconductor (column; 1 lines 15-29).

9. Claims 42, 43, 45 – 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyake et al. (US Patent 6,038,279) as applied to claim 37 above and further in view of Hassegawa et al (US Patent 6,144,719).

With respect to claims 42, 43 and 45, Miyake shows (Fig.10) that the mask (104) is spaced from the substrate (106) by a gap but silent about moving the stage to adjust the gap or using a displacement sensor. Hassegawa teaches a method of exposing a resist on a substrate, (Fig.8) wherein a mask (101) is spaced from the substrate (107), further method comprising the step of moving a stage to adjust a gap and using a displacement sensor for sensing the position of the substrate (column 9; lines 17 – 53) in order to provide precise alignment and desirable magnification. It would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the teachings of Hassegawa with the method of Miyake in order to provide precise alignment and desirable magnification while exposing the resist.

With respect to claims 46 and 47, Miyake shows generally all that is claimed except for using a displacement sensor to sense optimum position and/or gap between the mask and the substrate. Hassegawa teaches a method of exposing a resist on a substrate, (Fig.8) while using a displacement sensor for sensing the position of the substrate and a mask (column 9; lines 17 – 53) in order to provide precise alignment and desirable magnification. It would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the teachings of Hassegawa with the method of Miyake in order to provide optimum position and/or gap between the mask relative to the substrate allowing desirable pattern transfer with higher accuracy while exposing the resist.

With respect to claim 48, Miyake shows (Fig.10) that the mask (104) is spaced from the substrate (106) by a gap but silent about controlling mask to wafer misalignment using a displacement sensor. Hassegawa teaches a method of exposing a resist on a substrate, (Fig.8) wherein a mask (101) is spaced from a wafer (105), further method comprises alignment between the mask (101) and the wafer (105) using a displacement sensor (column 9; lines 17 – 53) in order to provide precise alignment. It would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the teachings of Hassegawa with the method of Miyake in order to provide precise alignment allowing desirable pattern transfer with higher accuracy while exposing the resist.

With respect to claim 49, Miyake shows generally all that is claimed except for using a displacement sensor output to control substrate x, y, z, rotation and

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magnification. Hassegawa teaches a method of exposing a resist on a substrate, (Fig.8) wherein a mask (101) is spaced from the substrate (107), further method comprising the step of control substrate x, y, z, rotation and magnification using a displacement sensor for sensing the position of the substrate (column 9; lines 17 – 53) in order to provide precise alignment and desirable magnification. It would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the teachings of Hassegawa with the method of Miyake in order to provide precise alignment and desirable magnification allowing desirable pattern transfer with higher accuracy while exposing the resist.

With respect to claim 50, Miyake shows generally all that is claimed except for a beam transport chamber having helium or other low attenuation gas at atmospheric pressure or at lower pressure. Hassegawa teaches a chamber (113), which is set in a low-pressure helium atmosphere (column 1; lines 49 and 50 and column 9; lines 54 and 55) it would allow to control the temperature and humidity and at the same time, minimize particle and molecular contamination. It would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the teachings of Hassegawa with the method of Miyake in order to provide step minimizing the effects of temperature and airflow allowing desirable pattern transfer with higher accuracy while exposing the resist.



***Allowable Subject Matter***

10. Claims 44 and 52-56 are allowed.

11. Claims 11-25 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, first paragraph, set forth in this Office action.

12. Claim 51 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

13. The following is a statement of reasons for the indication of allowable subject matter:

With respect to claims 11-25, 44 and 51 – 56 prior art fails to disclose or make obvious a method of exposing a resist comprising sensing position of a substrate with displacement sensor comprising a differential variable reluctance transducer (DVRT) as claimed.

***Conclusion***

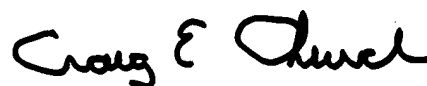
14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Irakli Kiknadze whose telephone number is 571-272-2493. The examiner can normally be reached on 9:00- 5:30.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on 571-272-2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Irakli Kiknadze  
February 6, 2004  
IK



**Craig E. Church**  
**Primary Examiner**